UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,301	10/06/2003	Hiroo Takizawa	Q77851	4148

65565 7590 01/22/2008

SUGHRUE-265550
2100 PENNSYLVANIA AVE. NW
WASHINGTON, DC 20037-3213

EXAMINER	
ANGEBRANNDT, MARTIN J	
ART UNIT	**PAPER NUMBER**
1795	

MAIL DATE	DELIVERY MODE
01/22/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/678,301	TAKIZAWA ET AL.	
	Examiner	Art Unit	
	Martin J. Angebranndt	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2007 and 30 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16 & 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/9/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The response of the applicant has been read and given careful consideration. The proper terminal disclaimers are sufficient to obviate the double patenting rejections. The amendment to the claims obviates the previous rejections.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farid et al. '529, in view of Harada et al. '032 and Swainson et al. '861

Farid et al. '529 forms a composition comprising dye PS-31 (col 23-24), a binder, monomer and inhibitor and an activator, exposed to light and the number of steps hardened determined. (see also 16/27-18/19). The dye PS-31 has a absorption maximum of 453 nm. Other sensitizers used include the cyanine dyes of table 1 (PS-1 through PS-12), styryl dyes PS-13 through PS-20 and xanthene dyes PS-32 to PS-33. The use of various substrates including aluminum and lithographic paper is disclosed. (14/17-36). The use of oxonol dyes is disclosed merocyanine, hemioxonol, cyanine , hemicyanine and styryl dyes. (4/27-44)

Harada et al. '032 teach the curing of photopolymerizable compositions using two photon processes. The light is an ultrashort pulses from a Ti:Sapphire. [0013]. The two photons absorbed add up to the energy of a photon of half their wavelength and curing takes place only where the focus occurs resulting in high resolution capability and fewer problems. [0016-0019].

The Ti:Sapphire emits a pulse of 100-300 fs pulse at a wavelength within the 700-900 nm range. [0044-0045].

Swainson et al. '861 establish that the use of two photon processes is old and well known in the imaging arts. In the embodiments of Class I, Group 2, a two photons of the same wavelength are used to cause the photoreaction. The energy difference between the two states being greater than the energy of a single photon, but equal or less than twice the energy of the photon. The starting point is a material with known one photon photoresponsive properties. Example 3 is a photopolymerization system including xanthene dye sensitizer eosin Y. (5/30-6/35). The two photon sensitivity of cyanine dyes is disclosed. (12/48-51).

It would have been obvious to one skilled in the art to modify the process of Farid et al. '529 in the examples using dye PS-31 by using a two photon exposure process with a Ti:Sapphire laser tuned to a wavelength of 900 nm which is near the two photon absorption of maxima of ~ 906 nm as taught by Harada et al. '032 to increase the resolution of the imaging process as discussed by Harada et al. '032 with a reasonable expectation of exciting the two photon polymerization based upon the teachings of Swainson et al. '861 showing this for cyanine and xanthene dyes and establishing that a good starting point is a compound having a single photon response, which is established for the oxonol dye PS-31 by Farid et al. '529.

The applicant argues that the examiner's position is based upon hindsight and obvious to try reasoning. The examiner disagrees, noting that the as the photons used ~900 nm are half of the energy of the absorption maxima and all compounds inherently will have a two photon cross section (the probability of a two photon absorption), there is a reasonable expectation that a two photon absorption will occur with the compound PS-31with this position being supported by

Swainson et al. '861 and Penzkofer et al., "S_0 and S_1 two photon absorption dynamics of organic dyes solutions", Opt. Quantum electron. Vol. 19 pp. 327-349 (1987) who discuss the use of cyanine dyes in two photon processes and the motivation to use a two photon process comes from Harada et al. '032 and Swainson et al. '861 who teach the increased resolution and ability to write three dimensional structures. The rejection stands.

The examiner notes that the claims are not limited to any minimal cross section and it appears that all the oxonol dyes D-149 to D-201 have a cross-section over 1000 GM. The examiner agrees that higher cross sections yield improvements in sensitivity and suggests the applicant modify claim 16 by replacing "and present " with - - where the two photon cross-section is at least 1000 GM , which is - - to make the arguments and the claims coextensive. The applicant asserts that the magnitude of the cross section cannot be determined, but as the size of the cross section is unrecited this is moot and further the claims are not limited to exposures at the appropriate wavelenth for these cross section to be realized. The applicant asserts that the magnitude of the cross section cannot be detemined from the structure. The examiner believes that it would be reasonsble to expect similar dyes, ie, polymethines, such as cyanine, merocyanine, oxonol and squarine dyes dyes, to have similar cross sections. The examiner notes that Scherer et al. "Two photon states in squarine monomerds and oligomers", Chem. Lett., vol 279 pp 179-207 (2002) discloses values of 0-5065 GM for squarine dyes in table 2 on page 190 and US 2005/0231776 (equivalent to JP 2003-283231) teach cyanine dyes with cross sections of 192-25120 GM at [0123]. Only 8 of the 19 inventive compounds disclosed in table III-1 have absorption cross sections of more than 1000 GM, so if the applicant used wavelengths at

which these cross sections occurred in the instant claims, it is reasonable to hold that the exposure processes will glean the benefit of this sensitivity, which would be higher than that of similar, polymethine compounds.

4. Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farid et al. '529, in view of Harada et al. '032 and Swainson et al. '861, further in view of Penzkofer et al., "S_0 and S_1 two photon absorption dynamics of organic dyes solutions", Opt. Quantum electron. Vol. 19 pp. 327-349 (1987)

Penzkofer et al., "S_0 and S_1 two photon absorption dynamics of organic dyes solutions", Opt. Quantum electron. Vol. 19 pp. 327-349 (1987) teaches the two photon absorption of trimethine dye HMICI and PYC, with PYC bearing ketone containing terminal moieties similar to those of an oxanol dye. The two photon cross section of the dye PYC is ~18 GM (table 1, $\sigma^{(2)}$).

In addition to the basis provided above, the examiner cites Penzkofer et al., "S_0 and S_1 two photon absorption dynamics of organic dyes solutions", Opt. Quantum electron. Vol. 19 pp. 327-349 (1987) to futher support the position that the oxonol dye PS-31 will have an appreciable two photon absorption cross section, sufficient to cause two photon polymerization, further supporting the obviousness of the combination of Farid et al. '529, in view of Harada et al. '032 and Swainson et al. '861 set forth above.

The response above is relied upon here.

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Martin J Angebranndt
Primary Examiner
Art Unit 1795

01/17/2008